

## RESOURCE DEVELOPMENT COORDINATING COMMITTEE

Public Lands Section  
Department of Natural Resources  
1594 West North Temple  
Room 3710  
February 13, 2007 - 9:00am

### Minutes

#### Members Present:

LOWE, Mike - Utah Geological Survey  
ZAREKARIZI, Susan – Div. Parks and Recreation  
ADAMS, Todd – Div. of Water Resources  
BLAKE, John - SITLA  
WHITE, Susan – DOGM  
CLARK, Robert – Div. Air Quality  
BAILEY, Carmen - Div. of Wildlife Resources  
GRIERSON, Dave – Div. Forestry, Fire & State Lands  
SEDDON, Matthew – Div. of State History  
SCHLOTTHAUER, Bill – Div. of Water Rights  
WILDE, Ken – Div. of Drinking Water  
MARSHALL, Shane - UDOT  
BOHN, Ralph – Div. Solid Hazardous Waste  
WATANABE, Judy – Div. of Homeland Security  
QUICK, Shelly – Div. Water Quality  
Grubaugh-Littig, Pamela - DOGM

#### Others Present:

WRIGHT, Carolyn - PLPCO  
JEMMING, Jonathan – PLPCO  
JAMES, Bill - DWR  
MATOVICH, Jeanette - BLM  
ROBINSON, Kirk – Western Wildlife Con.  
JANAZELLI, Lorraine – Forest Service  
TABET, Dave - DOGM

Susan Zarekarizi, Chair, called the meeting to order at approximately 9:00 a.m.

#### **I. Approval of Minutes**

The minutes from the January 9, 2007 meeting were approved by Dave Grierson, and seconded by Matthew Seddon. The motion passed unanimously.

#### **II. Utah's Oil Shale Resources – Dave Tabet (DOGM)**

Dave Tabet gave an overview on Utah's Oil Shale Resources, (please see attached power point presentation). For further questions he can be reached at (801) 537-3373.

#### **III. Reports from Agencies on Any Anticipated Projects**

Carmen Bailey, Division of Wildlife Resources, had nothing to report at this time however, there was question raised if a Wolf Management Plan was being prepared at this time.

Todd Adams, Division of Water Resources, reported Dreissena Mussels (commonly referred to as Zebra mussels) originated from the rivers of Eastern Europe. These mussels were first discovered in the United States in the Great Lakes around 1986-1988. They had been transported by the shipping industry. The mussels have spread throughout the eastern United States due to the absence of natural predators, high reproductive potential, adaptability to available aquatic habitats, and unintentional human transport. Expanding populations of these species are now found throughout the Mississippi, Missouri, and Arkansas River drainages. Reported densities from the Great Lakes area indicate rates of over 10,000 mussels per square meter at some facilities.

One of the Dreissena mussel species (Quagga mussel) was recently discovered during January 2007 in Lake Mead and other downstream reservoirs of the lower Colorado River. Finding these mussels in the Colorado River system expands the documented range of invasion by over 1000 miles from

previously known locations to the east. The proximity of these reservoirs to those located in Utah significantly increases the risk that *Dreissena* mussels could infest state waters. Infestation events are usually first documented in or around boating facilities, indicating a strong correlation to their being transported through boating and other aquatic related activities. Irrigation and other water delivery systems, common throughout Utah's arid environments, are other pathways whereby aquatic invasive species can be transported.

The infestation of mussels in the eastern United States has caused millions of dollars of economic loss to public agencies and private industry. Zebra mussels can severely hinder the delivery of water for domestic, municipal, industrial, and agricultural purposes due to their ability to clog or foul pipes, pumps, water intake screens, water treatment facilities, power plant intakes and cooling systems, and fish screens. The boating industry incurs additional recreation costs associated with boat and motor damage, cleaning costs, and disinfection needs required for containment at infected waters. The mussels impact public safety along beach areas on recreational waters (unprotected feet) due to the sharpness of the bivalved shells.

Ecologically, zebra mussels alter aquatic environments by filtering from the water the essential nutrients and green algae that form the base of the food chain required by native species and sport fish for growth and survival. A major concern is the potential impacts from infestation to Utah's native sensitive species, which have already declined to low population levels due to other negative factors such as habitat loss. Other concerns include potential impacts to important recreational fisheries and the potential to interfere with irrigation, municipal and industrial water delivery facilities.

To date there is no known method to eradicate them after establishment. Prevention through education and interdiction are the first lines of defense against invasion of these species.

To protect and preserve public safety of Utah's citizens, its critical water resources and uses, the economy of its aquatic based recreation and its valuable fish and wildlife resources, the Department of Natural Resources is working on a policy that will provide direction on the prevention of infestation of Zebra mussels into the State's waters.

**Bill Schlotthauer, Division of Water Rights**, reminded the Committee on March 13, 2007, there would be a public meeting to discuss the process to develop a groundwater management plan at Enterprise High School.

**Lorraine Januzelli, Forest Service**, reported the Wasatch-Cache is undertaking a study that will determine the suitability of 88 eligible river segments on NFS lands statewide for Congressional designation as "wild and scenic." Designations are tiered into three categories: wild, scenic and recreation, with "wild" segments receiving the most protection. One-third of the segments to be studied are on the Wasatch-Cache and total approx. 270 miles. Status: The study is set to commence in mid-March and should be completed within 18 months. Currently, we are establishing a project team, coordinating with State of Utah Public Lands Policy Office, and gathering river eligibility information from each forest.

Secure Rural Schools and Community Self-Determination Act. The President's FY 2008 Budget for the Forest Service includes a legislative proposal that would provide a funding source for any future proposals to extend the Secure Rural Schools and Community Self-Determination Act of 2000 (SRS) through 2011. The funding would come from the sale of isolated parcels of National Forest system lands (nationwide: 273,806; Utah: 5,813). This year's proposal is different from last year's in that it directs that 50% of land sale receipts to remain within the state they were collected, to be used for the acquisition of land and access for the NFS system, conservation education, and wildlife and fish habitat restoration. More details are posted on our national website at: [http://www.fs.fed.us/land/staff/rural\\_schools.shtml](http://www.fs.fed.us/land/staff/rural_schools.shtml)

**Jeanette Matovich, BLM**, gave an update of upcoming BLM projects - BLM's goal is to finish the RMPs for Price, Vernal, Kanab, Moab, Monticello, and Richfield field offices by June of 2008. Please continue to check ENBB website for new information. BLM will grant comment periods on EAs, when requested to do so. The web address for ENBB's <http://www.ut.blm.gov/ENBBTEMP/enbbtemp.html>

**Dave Grierson, Division of Forestry Fire and State Lands (FFSL)**, reported, there is a proposal out for the Jordan River Parkway to stabilize the trail at 10<sup>th</sup> North. Wednesday February 21, 2007, Great Salt Lake technical meeting will be held at the state Library (by EPA building).

**Shane Marshall, UDOT**, reported they have several projects – 10<sup>th</sup> South (Lehi), Tooele and Mountain View Corridor.

**Jonathan Jemming (Jonny), PLPCO**, reported he has put together a power point presentation and has met with several of the counties to discuss how to utilize RDCC more effectively.

#### **IV. Adjournment**

The meeting adjourned at approximately at 10:25 am, the next meeting will be held March 13, 2007, Department of Natural Resources, 1594 West North Temple, room 3710.

# **Utah Oil Shale – what and where is it, how much is there, and why is it important?**

**Resource Development Coordinating Committee  
February 13, 2007**

***David Tabet and Michael Vanden Berg  
Energy and Minerals Program  
Utah Geological Survey***

# **Presentation Objective**

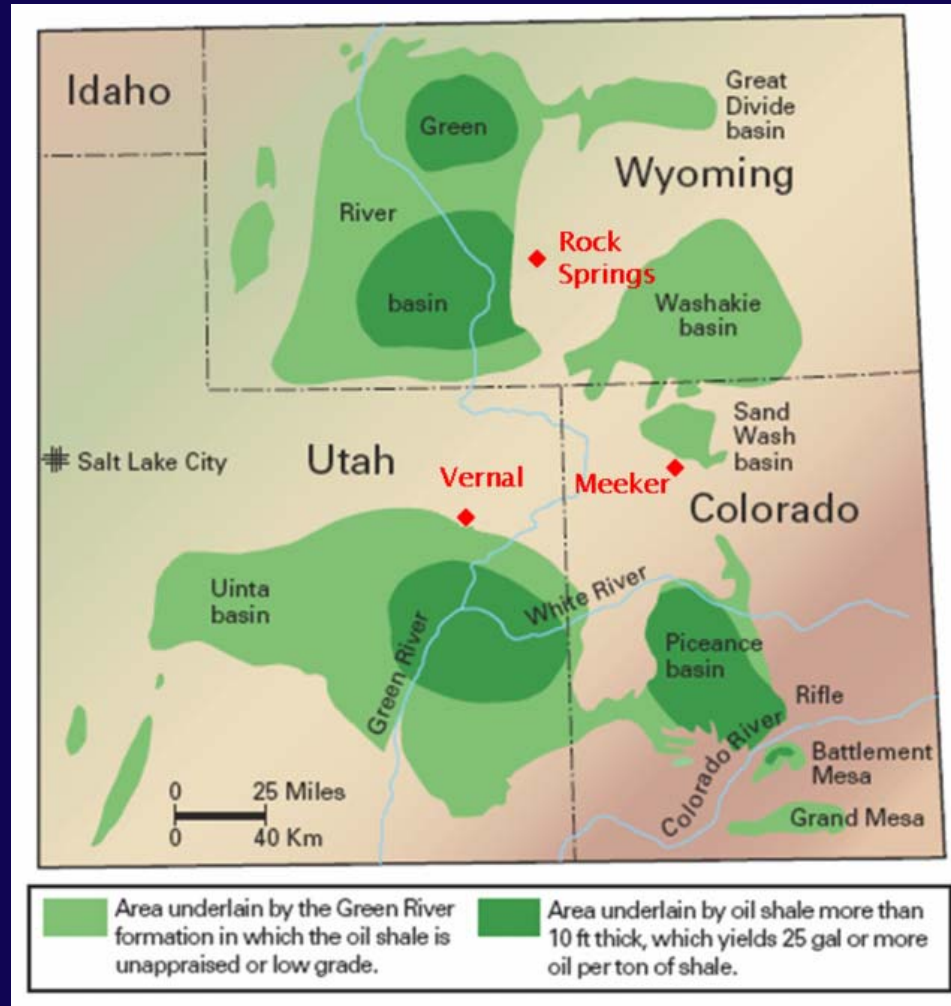
- Show geologically what is oil shale and where Utah's deposits occur in the Uinta Basin of northeastern Utah.**
- Describe the thickness, grade (in gallons per ton), and quantity of the identified oil shale resources in the Green River Formation of Utah.**
- Discuss why oil shale deposits may be important to Utah as an energy resource.**

# What is Oil Shale?



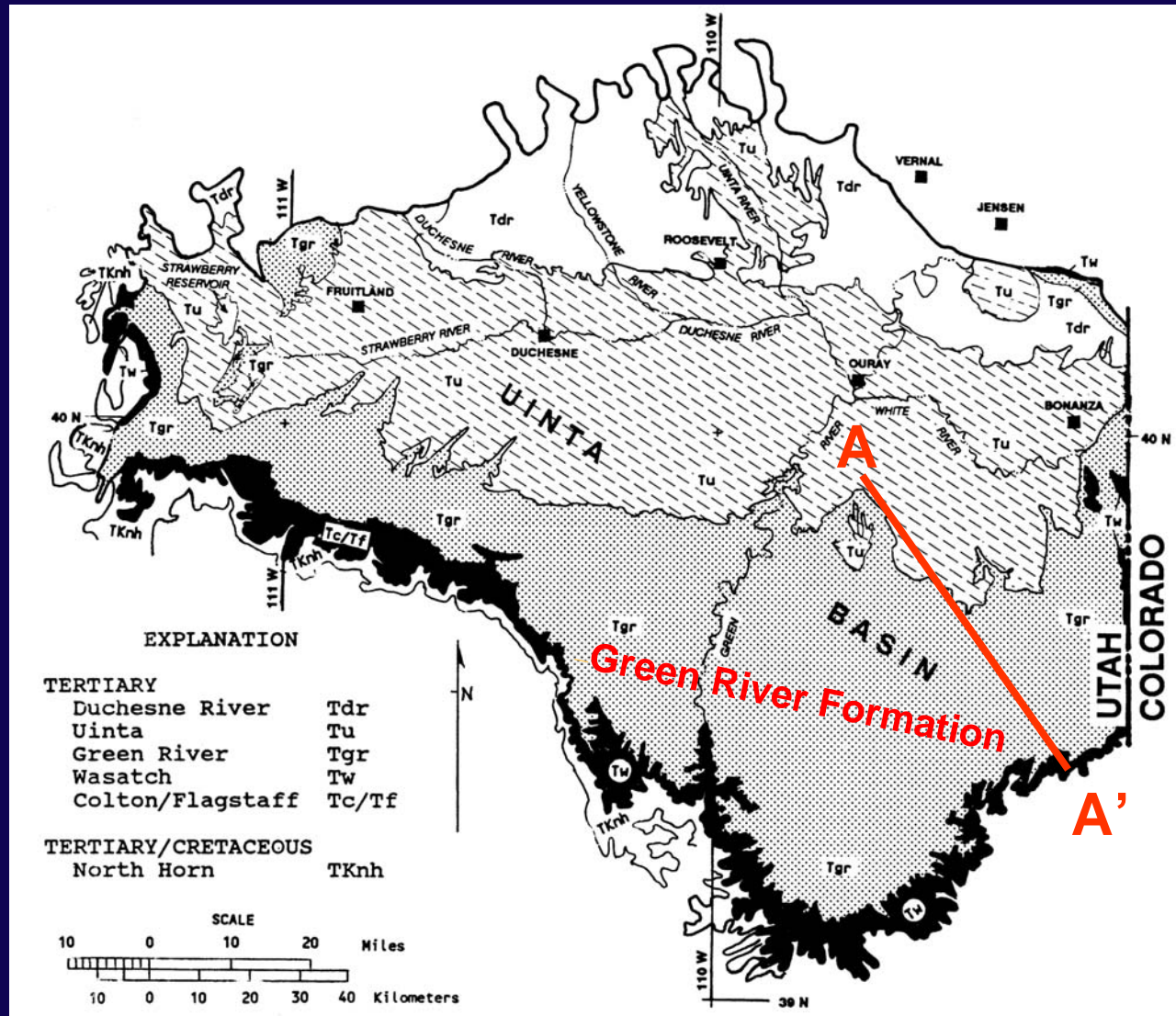
- Organic, lime-rich mud deposited in a lake.
- The organic material is kerogen, not oil, that upon heating produces crude oil and natural gas.

# Green River Formation Oil Shale Basins





# Uinta Basin Geologic Setting



—Source: Gwynn, 1992, UGA 20



# Uinta Basin

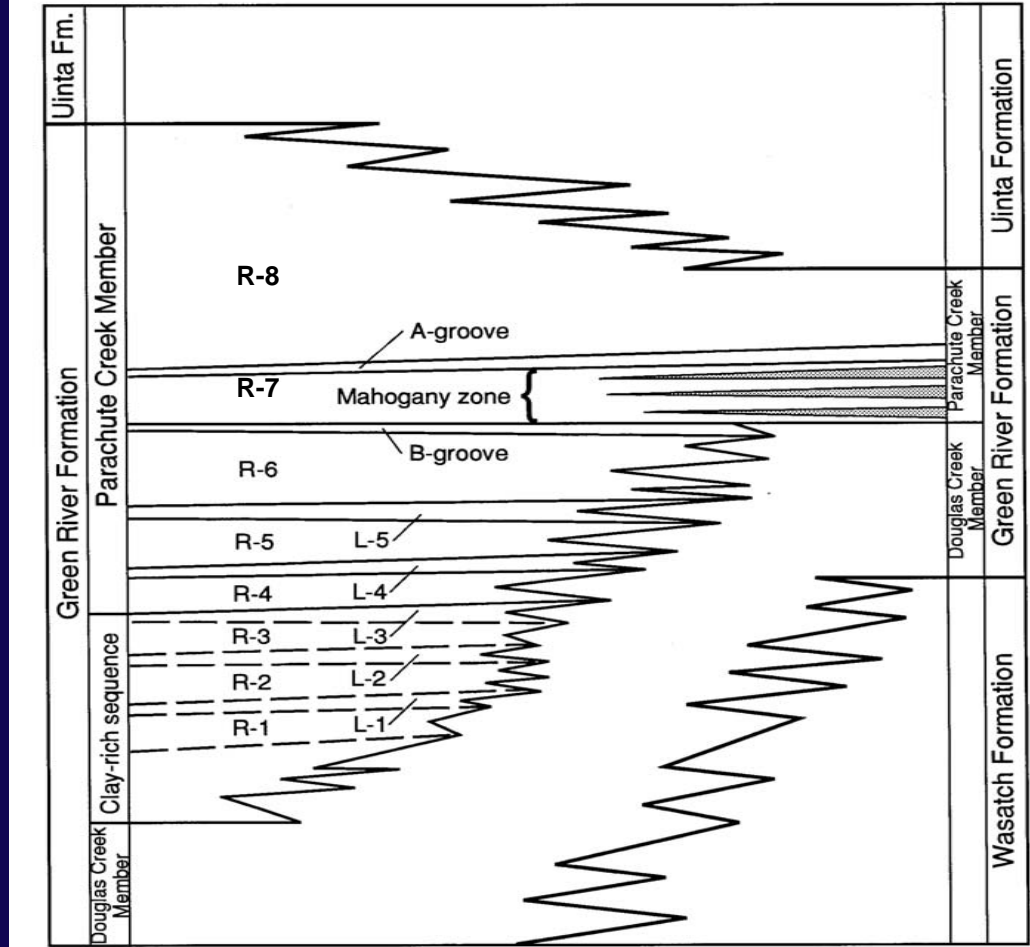
## Green River Stratigraphy

A

Lake-Center  
Sequence

Lake-Margin  
Sequence

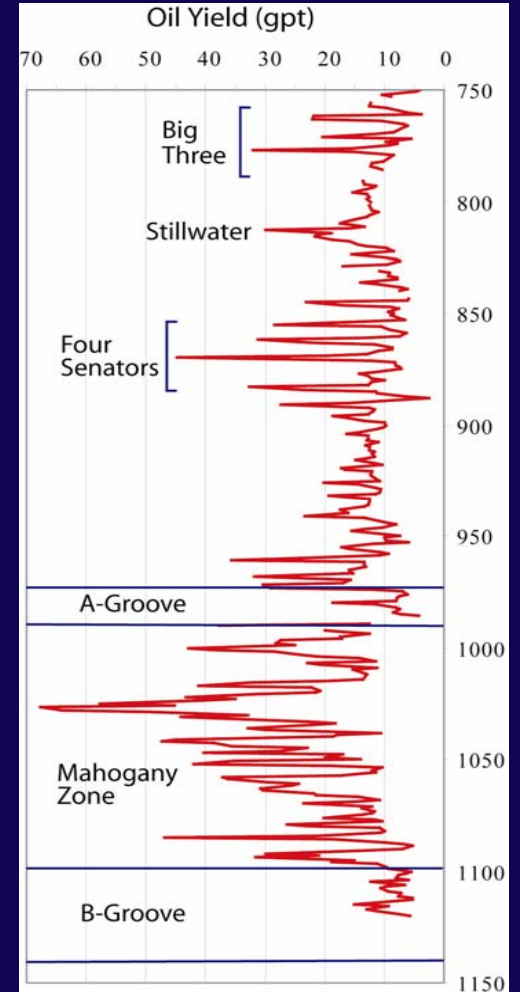
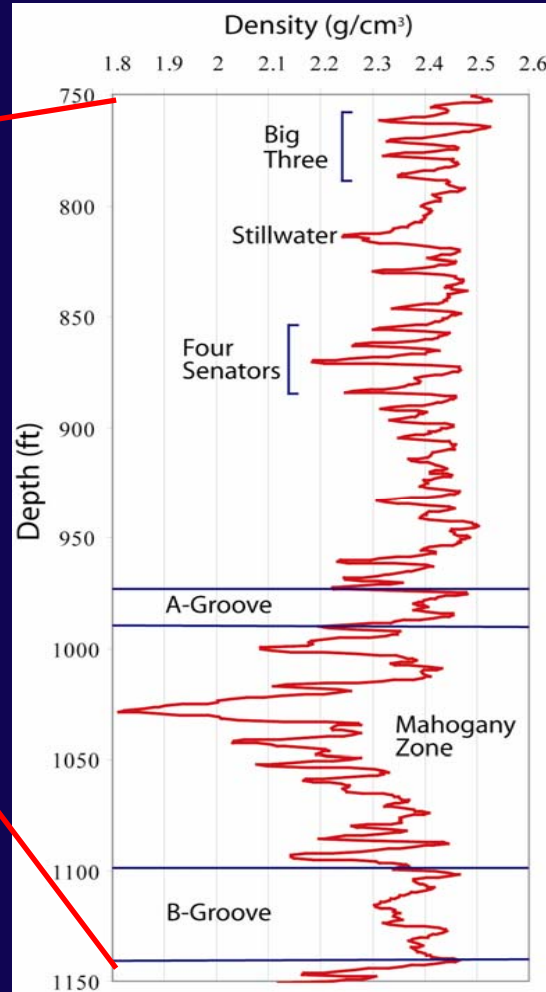
A'



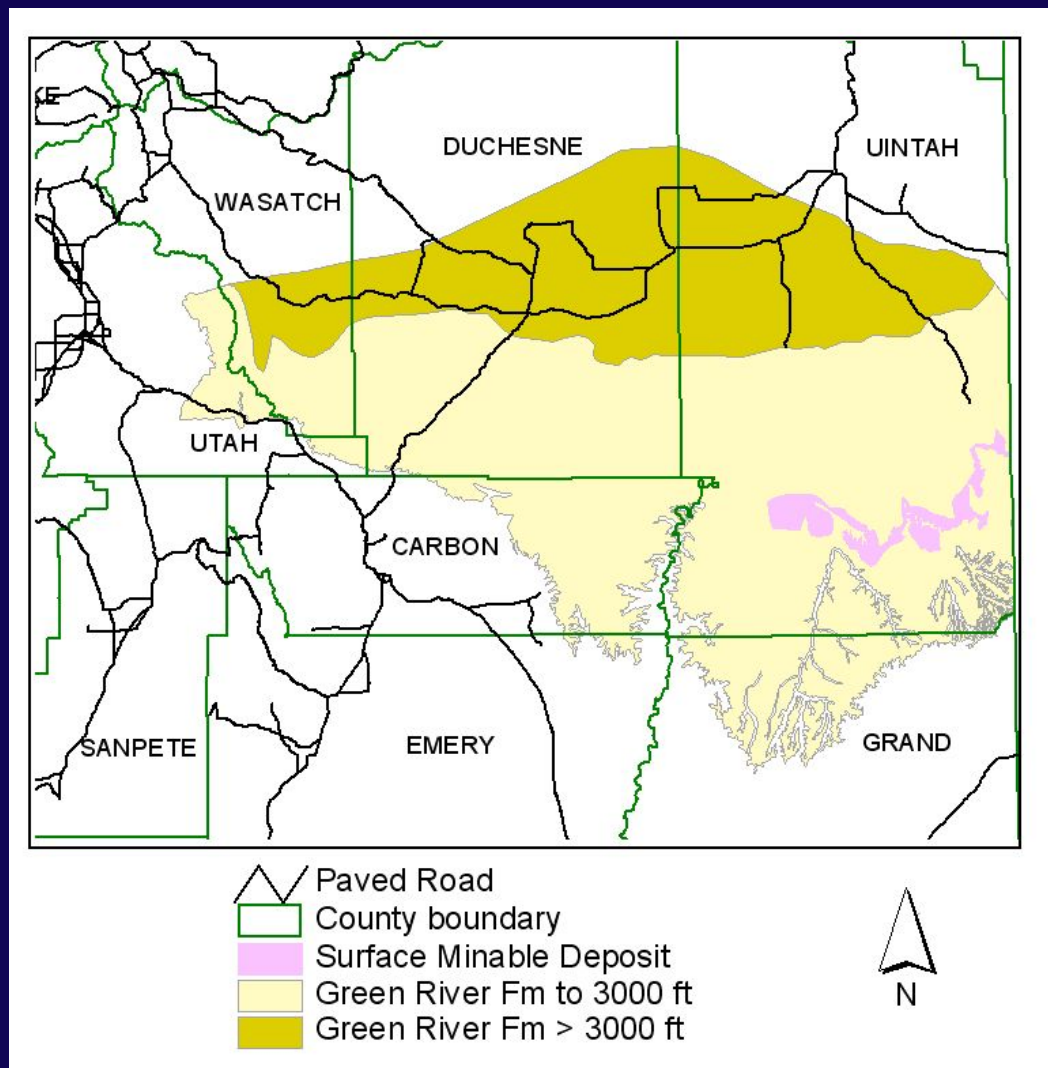
Source: Cashion, 1992, UGA 20

# Grade of Utah Oil Shale

UINTA FORMATION		
GREEN RIVER FORMATION	PARACHUTE CREEK MEMBER	
		R-8
		Big Three
		Stillwater
		Four Senators
		Wavy Tuff
		A-Groove
		Mahogany Zone (R-7)
		Mahogany Marker
		Mahogany Bed
		Curly Tuff
		B-Groove
		R-6
		L-5
		R-5
		L-4
		R-4
		L-3
		R-3
		L-2
		R-2

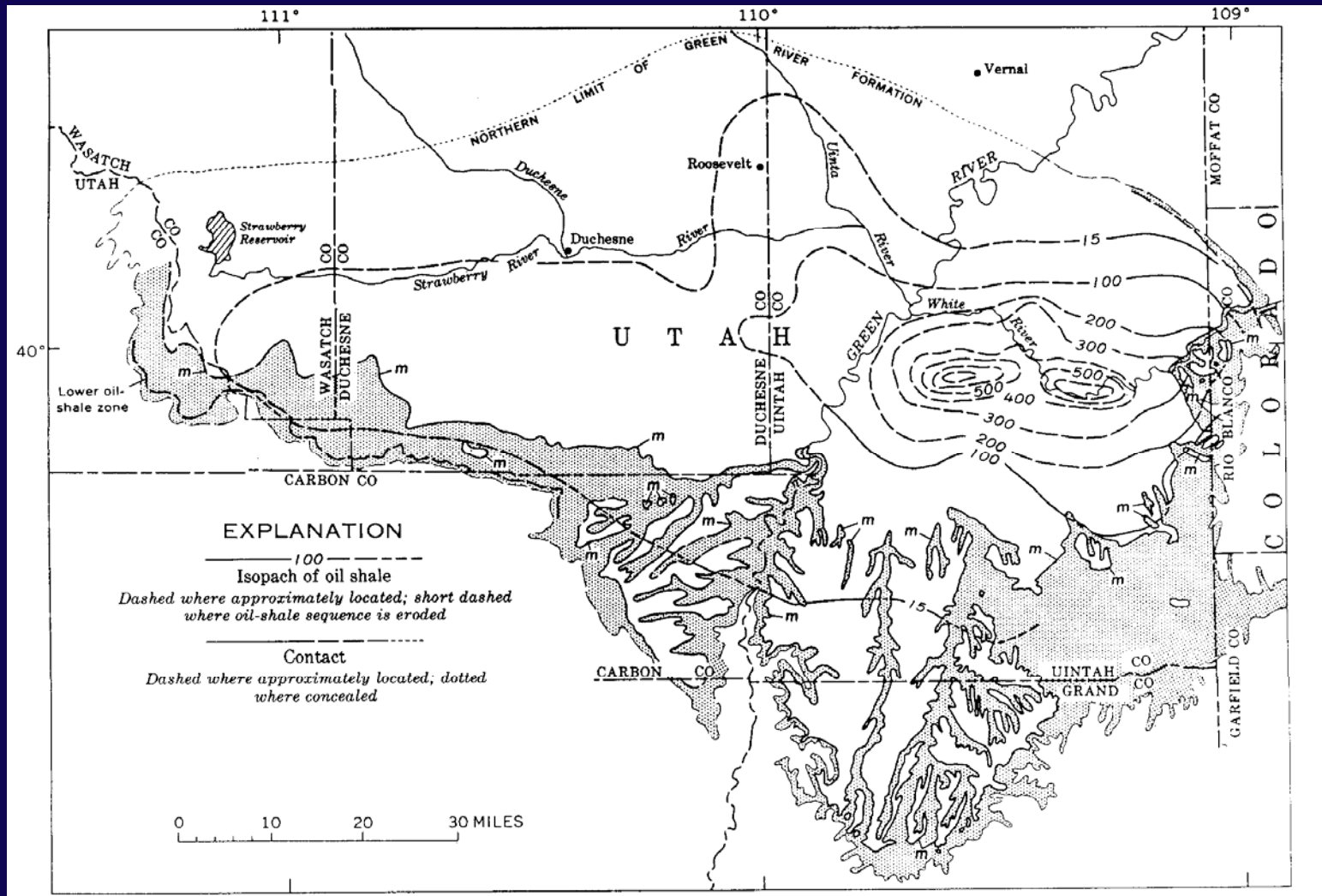


# Depth of Green River Formation



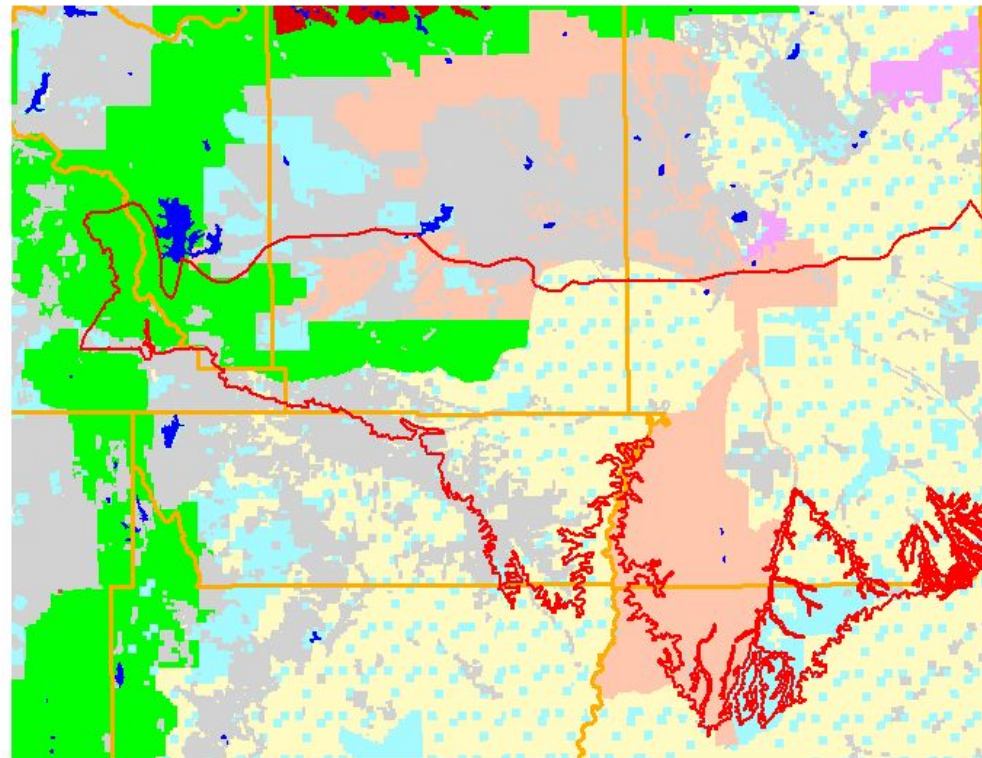
# Thickness of Utah Oil Shale

(beds with an average yield of 15 gal/ton)



Source: Cashion, 1967, USGS

# Uinta Basin Land Ownership



Green River Fm to 3000 ft

County

Ownership

US FOREST SERVICE

BLM

STATE

NATIVE AMERICAN

PRIVATE

MILITARY

NATIONAL PARK, MON., REC. & WILDLIFE AREA

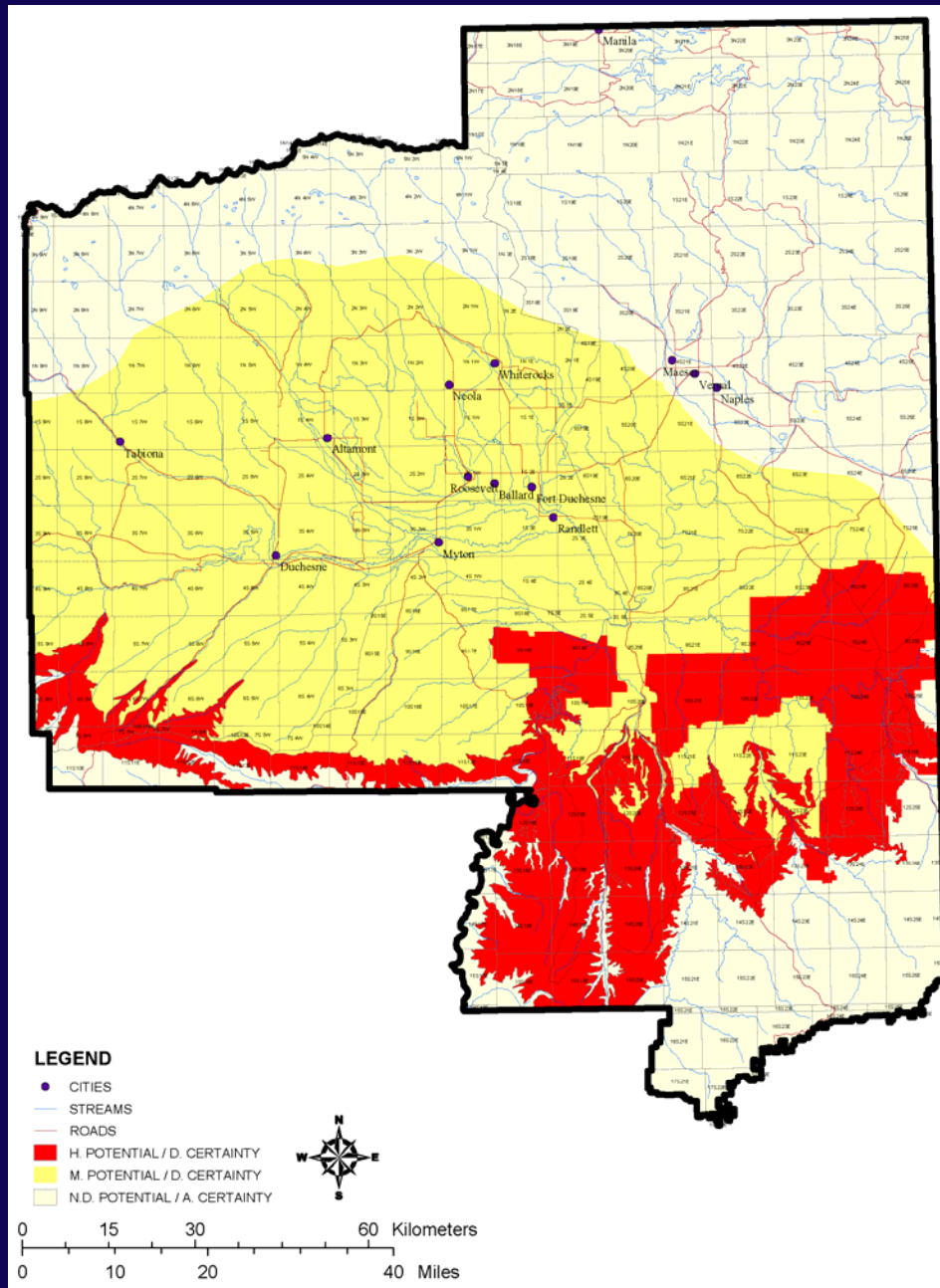
WILDERNESS

WATER



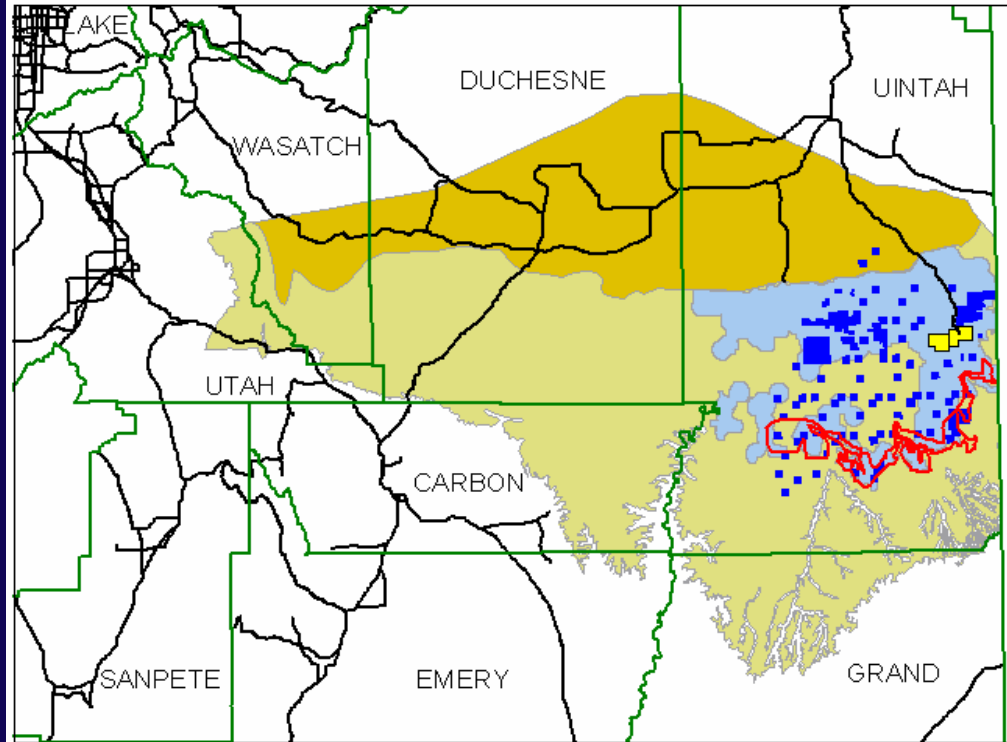


# Oil Shale Occurrence Potential



from: draft  
BLM Vernal  
RMP, 2006





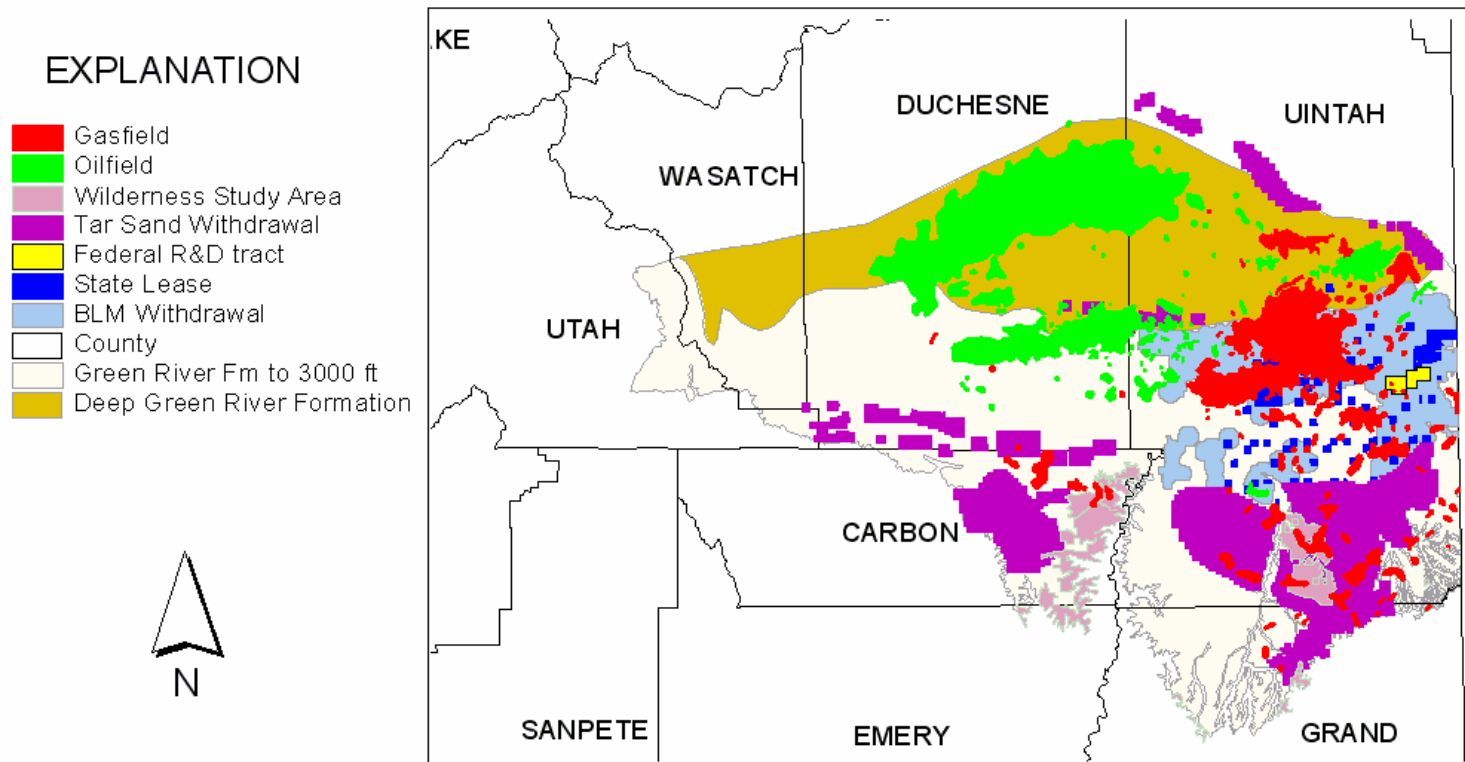
# Uinta Basin Leasing

## ***U.S. Green River Oil Shale Resources (in-place)***

<b>–Colorado</b>	<b>1000 billion bbls</b>
<b>–Wyoming</b>	<b>300 billion bbls</b>
<b>–Utah</b>	<b>321 billion bbls</b>
<b>–TOTAL</b>	<b>1621 billion bbls</b>

**–Source: Bartis and others, 2005, Rand Corporation**

# Uinta Basin Resource Conflicts



# **Uinta Basin Hypothetical Underground Mine**

- **Prototype federal lease - 5120 acres**
- **Thickness - 48 feet**
- **Oil Content - 30 gal/ton**
- **In-place Oil Resource - 500 million bbls**
- **Recoverable Oil Resource - 250 million bbls**

# **Uinta Basin Hypothetical Mine**

- **Daily Oil Production - 50,000 bbls**
- **Annual Oil Production – 17.5 MM bbls**
- **Daily Shale Production – 75,000 tons**
- **Annual Shale Production – 26.3 MM tons**
- **Mine Life – 14 years**
- **Estimated Commercial Date – 2020?**

# Conventional vs. Oil Shale

- 2379 producing oil wells in 2005
- Average well pad size - 5 acres
- Total well disturbance - **11,595 acres**
- 2005 annual production - **16.7 MM bbls**
- Oil shale mine size - **5120 acres**
- Annual shale oil produced - **17.5 MM bbls**



# How Can it be Recovered ?



Mining & surface retorting

(Photo on left by Heikki Bauert, Estonia)

Underground in-situ retorting  
(Photo on right from Shell Oil)



# **Environmental Concerns**

- Disturbance of land surface
- Disposal of spent shale
- Impacts on water and air quality
- Impacts on sensitive species
- Energy efficiency

# What is the UGS doing?

- Utah oil shale database

- Digital Fischer assays for 581 wells
- Scanned geophysical logs for 139 wells
- Lithologic descriptions for 132 wells
- Formation tops information for over 1000 wells
- Utah oil shale bibliography with 979 references
- Utah oil shale resource map

- Future work

- Improve oil shale resource estimates

# Conclusions

- **Uinta Basin contains substantial resources of kerogen in the Green River Formation; equivalent of at least 300 billion barrels.**
- **Conflicts exist with conventional oil and gas development, tar sand resources, as well as wilderness study areas.**
- **Total basin-wide and recoverable resource unknown without proven economic recovery technology; UGS working to improve estimates.**
- **One oil shale mine of 5120 acres could replicate 2005 oil production from over 2300 wells for 14 years; commercial industry unlikely before 2020.**

***Thank You !***

**Questions?**